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Taxonomic revision and additional comments of some bats (Mammalia, Chiroptera) reported from Bolivia, with an updated checklist based on voucher material with verified identities

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Abstract. We review the taxonomic identities of museum specimens of three bat species previously reported from Bolivia. We comment on some erroneously reported taxa, or taxa either not represented by voucher materials or based on insufficient data (including acoustic detections) to verify their taxonomic affinities. As result of this review, the list of bat species known to occur in Bolivia is updated to eight families and 133 species, unlike the nine families and 146 species of previous lists. Some recommendations for future research and a brief historical revision of bat inventories in the country are included.

Keywords. Biological collections, geographic distribution, invalid records, South America

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Introduction

Knowledge of the diversity of Bolivian mammals is the result of numerous national and international research initiatives, mostly linked to faunal surveys and the management of systematic collections (Anderson 1997; Tarifa 2014). Between the 1960s and 2000, five expeditions were conducted, which made substantial contributions to the inventory of bats in the country. The first expedition, in 1963, was part of a project aimed at the diagnosis of hemorrhagic fever and the identification of its reservoirs in the Beni Department, mainly carried out by the Panama-based and US-sponsored Middle America Research Unit. Between 1963 and 1966, the American Museum of Natural History (New York, USA) organized the second expedition, whose objective was to recognize ectoparasites associated with wild mammals. A third expedition, under the responsibility of Louisiana State University Museum of Zoology (1979–1981), surveyed bats mainly in La Paz Department. In 1986, the fourth expedition was executed by the Zoológico Municipal of Santa Cruz, in the Santa Cruz Department, under the leadership of Professor Noel Kempff Mercado and with the participation of researchers from Doñana Biological Station (Seville, Spain) (Cabot-Nieves 1996; Anderson 1997; Tarifa 2014). Finally, between 1984 and 1996, an important joint research was conducted by the American Museum of Natural History, the Museum of Southwestern Biology (University of New Mexico, New Mexico), the Colección Boliviana de Fauna (La Paz), and the Museo "Noel Kempff Mercado" (Santa Cruz), which was fundamental in training Bolivian biologists, in addition to collecting an important number of museum specimens (not only bats) in a geographic area defined by hundreds of localities across the country (Anderson 1997; Tarifa 2014). These expeditions provided a taxonomic list that includes around 40% of the bat species known from Bolivia, and their results represents an important advancement for the knowledge of this group of mammals in several regions of the country.

The first checklists of bats collected in Bolivia were published by Anderson et al. (1982) and Anderson (1997), who reported the presence of 79 and 105 species grouped into five and seven families, respectively. Subsequently, Salazar-Bravo et al. (2003) updated the inventory with 109 species belonging to eight families, Aguirre (2007) compiled 122 species representing eight families, and, three years later, Aguirre et al. (2010) reported 132 species grouped into nine families, substantially increasing the number of taxa recorded in previous years. Recently, Aguirre et al. (2019) and Díaz et al. (2021) provided two additional lists of the bats of the country, in which 138 and 146 species were included, respectively.

The most recent contributions to the knowledge of the Bolivian bat fauna represent the results of several initiatives conducted by local researchers interested in taxonomic and ecological studies. Their investigations have led to the discovery of undescribed species (e.g., Siles et al. 2013; Acosta et al. 2021) and the inclusion of additional species for the country (Calderón-Acevedo and Muchhala 2020; Poma-Urey et al. 2021). On the other hand, these initiatives made it possible to exclude species previously listed from Bolivia due to misidentifications (e.g., *Anoura fistulata* Muchhala, Mena and Albuja, 2005; Calderón-Acevedo and Muchhala 2018) or whose voucher material is not available for revision (e.g., *Micronycteris schmidtorum* Sanborn, 1935) (Aguirre et al. 2019).

The main principle and criteria supporting a taxonomic inventory of bat species of Bolivia is based on the golden rule that at least one voucher specimen of each taxon must be deposited in an open-access systematic collection for a species to be considered present in the country. In some cases, the unequivocal vocal signatures of a group of insectivorous bats (e.g., *Molossops* spp. and *Promops* spp.) allow to use their acoustic records as voucher material. However, in many other cases, there can be times when it is difficult to use echolocation calls to precisely identify species; examples of these situations are when bats are flying in clutter conditions or during social interactions, variations of the position or distance of bats with respect to the detector, and the absence of verified signals in a taxonomic context (Miller and Corben pers. comm.). Vouchers are the evidence for the occurrence of a species at a given time or place and constitute the baseline data on a species' distribution, habitat, morphological characteristics, echolocations patterns, and other aspects of the natural history (Ruedas et al. 2000; López-Vidal and Elizalde-Arellano 2006; Jung et al. 2007, 2014). In addition, because studies on the systematics of Neotropical bats are ongoing (e.g., Basantes et al. 2020; Esquivel et al. 2022), vouchered museum specimens are fundamental references of the taxonomic status and nomenclature changes of species.

In this study, we update the previous inventories of bats in Bolivia (Aguirre et al. 2019; Diaz et al. 2021), based on the existence of voucher specimens deposited in open-access systematic collections and the revision of their taxonomic identity. We exclude from our list species without available or verifiable voucher material, including those whose records based only on acoustic methods without fundamental evidence that allows for confirming their identities (e.g., reference images of typical search phase calls or the descriptions of basic parameters). In addition, we provide ancillary information for a handful of poorly documented species, in terms of their morphometric and qualitative characters (Emmons et al. 2006; Aguirre et al. 2010). Finally, we recognize by name a group of individuals and institutions whose contributions, either through of field and/or museum surveys, have generated an important part of the knowledge about the bats of Bolivia.

Methods

We reviewed systematic collections and literature for information validating the existence of voucher

material for each species included in previous list of bats recorded for Bolivia. The following institutions provided the data on museum specimens reported in this study: Centro de Biodiversidad y Genética (CBG), Cochabamba, Bolivia; Colección Boliviana de Fauna (CBF), La Paz, Bolivia; Museo Noel Kempff Mercado (MNKM), Santa Cruz, Bolivia; Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil and Universidade Federal da Paraíba (UFPB), João Pessoa, Brazil. Other valid literature records are found in the following systematic collections: American Museum of Natural History (AMNH), New York, USA; The Natural History Museum (BMNH), London, England; Carnegie Museum of Natural History (CM), Pittsburgh, USA; Colección de Mamíferos Lillo (CML), Tucuman, Argentina; Estación Biológica Doñana (EBD), Sevilla, Spain; Field Museum of Natural History (FMNH), Chicago, USA; Louisiana State University, Museum of Zoology (LSUMZ), Baton Rouge, USA; Museo de Historia Natural Alcide d'Orbigny (MHNC-M), Cochabamba, Bolivia; Michigan State University (MSU), East Lansing, USA; Museum of Texas Tech University (TTU-M), Lubbock, USA; National Museum of Natural History (USNM), Washington DC, USA; Universidade Estadual Paulista, São José do Rio Preto (SJRP), Brazil; University of Michigan, Museum Zoology (UMMZ), Ann Arbor, USA.

The data compiled from voucher specimens included collection name, catalogue number, locality (coordinates and elevation, when available), and the morphological features that allow systematic identification. When some of these items were not available, we added here information, including some somatic and dental skull measurements obtained following the criteria proposed by Barquez et al. (1999). On the base of this protocol, we generate an emended checklist of the bats from Bolivia, with the names of collectors and the dates in which each species was reported for the first time in the country. Importantly, this revised checklist is updated to 1 March 2023.

Results

We found a series of voucher specimens that have been misidentified in previous lists of bats from Bolivia and whose characters were re-evaluated, and their taxonomic affiliations are updated here. They are: Phyllostomidae: *Glyphonycteris behnii* (Peters, 1865), now assigned to *Micronycteris hirsuta* (Peters, 1869); Furipteridae: *Furipterus horrens* (Cuvier, 1828), now assigned to *Peropteryx macrotis* (Wagner, 1843), family Emballonuridae; and Vespertilionidae: *Histiotus macrotus* (Poeppig, 1835), now assigned to *H. diaphanopterus* Feijó, da Rocha & Althoff, 2015. Consequently, *G. behnii*, *F. horrens*, and *H. macrotus*, as well as the family Furipteridae, were eliminated from the list of bats known in Bolivia (Table 1).

We also examined the morphological characters of additional voucher materials of two species of Emballonuridae—*Cyttarops alecto* Tomas, 1913 and *Saccopteryx canescens* Thomas, 1901—known in Bolivia by a scarce number of records. These specimens represent significant distributional extensions and provide complementary data on the ecological patterns and taxonomy of both taxa.

Table 1. Wrong or unconfirmed original records, in addition to synonymized species previously reported from Bolivia. Acoustic records included in the list were not supported by fundamental data to confirm their identities (images of typical search phase calls or the description of basic parameters).

Taxa	References	Remarks
Emballonuridae (4)		
Centronycteris maximiliani	Venzal et al. 2013	Repository data or diagnostic characters not provided
Cormura brevirostris	Vargas-Espinoza 2007	Recorded with acoustic methods only
Diclidurus albus	Emmons et al. 2006	Recorded with acoustic methods only
Peropteryx kappleri	Emmons et al. 2006	Recorded with acoustic methods only
Phyllostomidae (5)		
Anoura aequatoris	Calderón-Acevedo et al. 2021, 2022	Junior synonym of *A. caudifer*
Anoura fistulata	Aguirre et al. 2019	No voucher specimen in systematic collection
Anoura peruana	Calderón-Acevedo et al. 2021, 2022	Junior synonym of *A. geoffroyi*
Glyphonycteris behnii	Terán 2010; this study	Specimen reidentified as *Micronycteris hirsuta*
Micronycteris microtis	Porter et al. 2007; Morales-Martínez et al. 2021	Junior synonym of *M. megalotis*
Furipteridae (1)		
Furipterus horrens	Aguirre et al. 2010; this study	Specimen reidentified as *Peropteryx macrotis*
Molossidae (2)		
Molossus currentium	Moya et al. 2007	Recorded with acoustic methods only
Molossus pretiosus	Aguirre et al. 2010; this study	No voucher specimen in systematic collection
Vespertilionidae (1)		
Histiotus macrotus	Acosta and Vanegas 2006; this study	Specimen reidentified as *H. diaphanopterus*

Figure 1. External details of *Micronycteris hirsuta*, CBF 10666. **A** dorsal fur. **B, C.** Tuft of hair and band of skin connecting the ears.

As a complement to the results described above, we found that six species previously included in the inventories of bat species known from Bolivia are not represented by verifiable vouchers in any systematic collection and some of them have been recorded only by acoustic detection without supporting data that allows for their identities to be confirmed (i.e., reference images of typical search phase calls or descriptions of fundamental parameters; Table 1). This group of taxa includes *Centronycteris maximiliani* (Fischer, 1829) (Venzal et al. 2013), *Cormura brevirostris* (Wagner, 1843) (Vargas-Espinoza 2007), *Diclidurus albus* Wied-Neuwied, 1820, *Peropteryx kappleri* Peters, 1867 (Emmons et al. 2006), *Molossus currentium* Thomas, 1901 (Moya et al. 2007), and *M. pretiosus* Miller, 1902 (Aguirre et al. 2010). In addition, some specimens suspected to represent *P. kappleri* (Aguirre and Urioste 1994) are *P. leucoptera* Peters, 1867 (Poma-Urey et al. 2021), and three taxa have been incorporated into synonymies: *Anoura aequatoris* (Lönnberg, 1921), *A. peruana* (Tschudi, 1844), and *Micronycteris microtis* Miller, 1898 (Porter et al. 2007; Morales-Martínez et al. 2021; Calderón-Acevedo et al. 2021, 2022). Finally, *Anoura fistulata*, considered by Aguirre et al. (2019) as member of the bat fauna of Bolivia, is not represented by a voucher specimen to verify the presence of this taxon in the country and one specimen previously identified as *A. fistulata* (FMNH 106088; Mantilla-Meluk et al. 2014) is *A. caudifer* (É. Geoffroy, 1818) (Calderón-Acevedo and Muchhala 2018).

Order Chiroptera
Family Phyllostomidae

***Micronycteris hirsuta* (Peters, 1869)**

Material examined. BOLIVIA – **La Paz** • Ixiamas; 13°59′02″S, 068°52′25″W; 1492 m alt.; 25.III.2003; Marcos Terán leg.; 1 ♂ adult, CBF 10666 (Figs. 1A–C, 2)

Identification. The specimen matches the qualitative descriptions of *Micronycteris* Gray, 1866 (Fig. 1), but it was erroneously identified as *Glyphonycteris behnii* by Terán (2010). Bats of the genus *Micronycteris* are characterized by having bicolored dorsal hair with a white base and brown tip, distally rounded ears joined by a band of skin across the head (Fig. 1B, C), and a chin with a pair of V-shaped dermal pads without a central papilla. In contrast, members of the genus *Glyphonycteris* Thomas, 1896 are mainly characterized by presenting unicolor or tricolor dorsal hair, but not bicolored, in addition to lacking a band of skin on the head that connects the ears (Simmons and Voss 1998). Some measurements of the specimen examined are as follows:

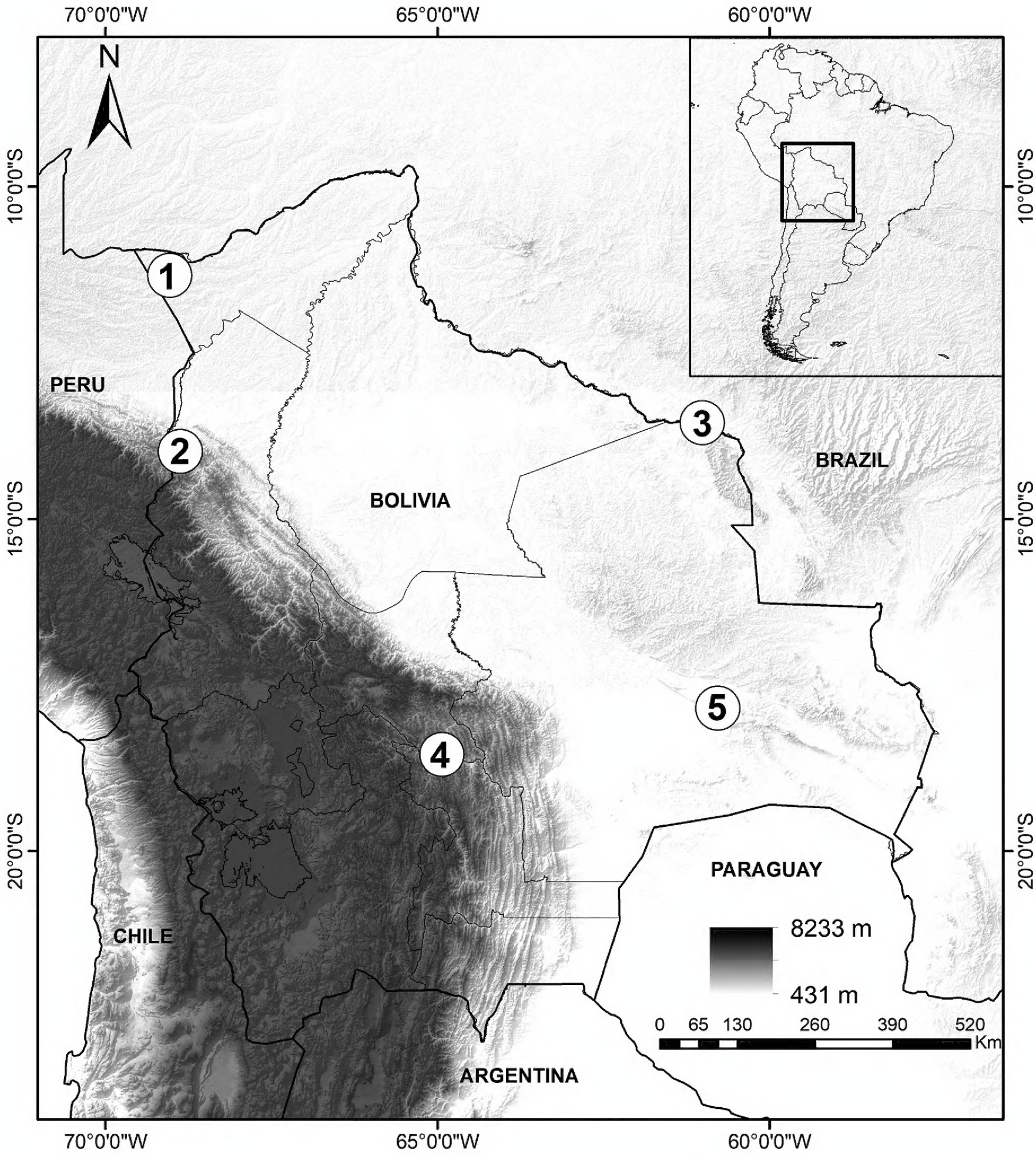

Figure 2. Geographic distribution in Bolivia of the revised specimens of the following species: 1 = *Cyttarops alecto*, CBG 401; 2 = *Micronycteris hirsuta*, CBF 10666; 3 = *Saccopteryx canescens*, MNKM 1910; 4 = *Histiotus diaphanopterus*, MNKM 3713; 5 = *Peropteryx macrotis*, MZUSP 7733.

total length = 67 mm, tail length = 13 mm, foot length = 13 mm, ear length = 24 mm, calcar length = 15 mm, forearm length = 47.36 mm, and weight = 15.5 g. The combination of qualitative characters and measurements of this specimen match with the diagnosis of *M. hirsuta*, which is the largest species among its congeners.

Remarks. The specimen CBF 10666 was erroneously considered as the only record of *G. behnii* from Bolivia by Terán (2010), who did not indicate the systematic collection where the voucher specimen was deposited nor any diagnostic characters by which it was assigned to *G. behnii*. However, this specimen was recently incorporated into the Bolivian Fauna Collection (CBF 10666), where a detailed morphological examination allowed us to identify it as *M. hirsuta*. This is only the second record of this bat species for Bolivia (Fig. 2), after the report of Azurduy and Emmons (2005). Considering that Terán's (2010) record of *G. behnii* from Bolivia was misidentified, the species maintains its status as endemic to Brazil (Zortea et al. 2016; Solari et al. 2019; Burgin et al. 2020).

Family Emballonuridae

***Peropteryx macrotis* (Wagner, 1843)**

Material examined. BOLIVIA – **Santa Cruz** • San José de Chiquitos; 17°51′S, 060°47′W; 311 m alt; V.1954; Carl Gans leg.; 1 ♀ adult, MZUSP 7733 (Figs. 2, 3A, B).

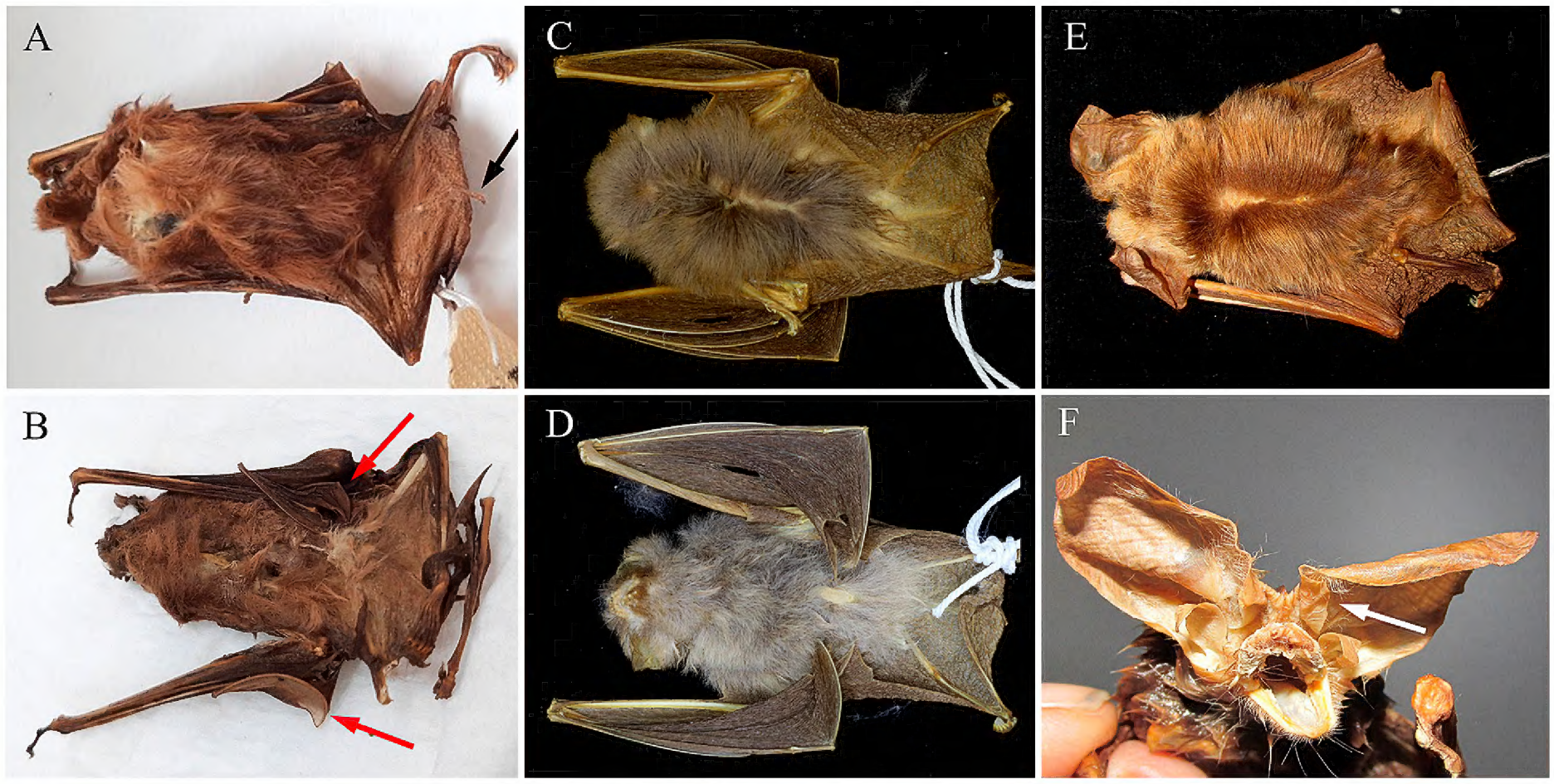

Figure 3. Dorsal and ventral views of external traits of some bat specimens. **A, B.** *Peropteryx macrotis* (MZUSP 7733). **C, D.** *Furipterus horrens* (UFPB 7994). Note free thumbs in *P. macrotis* vs. thumbs covered in *F. horrens*. The black arrow indicates the free tail on the uropatagium, while the red arrows indicate the phalanges of the third finger arranged first outward and then inward. **E, F.** View of the bicolored dorsal fur and the band joining the ears in *Histiotus diaphanopterus* (MNKM 3713), in addition to the highly developed lobe on the inner edge of ears (white arrow).

Family Furipteridae

***Furipterus horrens* (Cuvier, 1828)**

Materials examined. BRAZIL – **Minas Gerais** • Río Itacambiruçu; 16°34′32″S, 041°24′17″W; 239 m alt.; 2.V.1989; Renato N. Feio leg.; 1 ♂ adult, UFPB 7994 (Fig. 3C, D) – **Bahia** • Complexo eólico Zeus; 10°29′13″S, 040°29′51″ W; 822 m alt.; 29.III.2019; Mónica Pedroso leg.; 1 ♂ adult, UFPB 10797 – **Paraná** • Colombo, Gruta do Bacaetava; 25°13′55″S, 049°12′27″ W; 978 m alt.; 29.V.2015; Jennifer Barros leg.; 1 ♂ adult, UFPB 2185.

Identification. The specimen MZUSP 7733 was erroneously assigned to *Furipterus horrens* (Furipteridae) by Aguirre et al. (2010), even though its morphological characters correspond to the genus *Peropteryx* Peters, 1867 (Emballonuridae). In *F. horrens*, the forearm length is <38.5 mm, the tail is located within the uropatagium, and the thumbs are covered by the propatagium (Fig. 3C, D; Uieda et al. 1980; Novaes et al. 2012; Gardner 2008; Alfaro- Lara et al. 2018; Arroyo-Cabrales 2019). In contrast, MZUSP 7733, a female, has a forearm length of 42.76 mm, the phalanges of the third finger are arranged first outward and then inward, the tail is free over the uropatagium, the thumb is not covered by the propatagium, and the plagiopatagium is attached to the end of the tibia (Fig. 3A, B). Unfortunately, the skull is missing, and the forearm membrane is in poor condition, which prevents observation of the glandular sac; therefore, we considered other body parts when identifying this specimen. In considering the lack of ornamentation on the forearm and lines on the dorsal fur, we ruled out the genera *Rhynchonycteris* Peters, 1867 and *Saccopteryx* Illiger, 1811, respectively (although *S. gymnura* has no lines but has a forearm length <36 mm). On the other hand, as the thumb is exposed and the fur is dark brown, the specimen does not belong to the genera *Cyttarops* Thomas, 1913 or *Diclidurus* Wied-Neuwied, 1820 (Hood and Gardner 2008). The specimen also does not represent the genus *Centronycteris* Gray, 1838, as the color of the latter ranges from orange to reddish and the plagiopatagium is attached to the metatarsals near the toes. Finally, it differs from *Cormura* Peters, 1867 in having the plagiopatagium not attached to the metatarsals at the base of the feet (Hood and Gardner 2008). Taking into account these characteristics, we infer that MZUSP 7733 belongs to the genus *Peropteryx* and, considering that it is of medium size without translucent wing membranes, that the species is *P. macrotis*.

Taxonomic remarks. The family Furipteridae was included as part of the bat fauna of Bolivia based on the single specimen examined here, erroneously identified as *F. horrens* (Aguirre et al. 2010) and currently deposited in the Museum of the University of São Paulo. Comparison of this specimen with three individuals of *F. horrens* from Brazil (UFPB 2185, 7994, 10797; Fig. 3C, D) confirms our revised identification; therefore, the family is excluded from the list of Bolivian bats.

Family Vespertilionidae

***Histiotus diaphanopterus* Feijó, da Rocha & Althoff, 2015**

Materials examined. BOLIVIA – **Santa Cruz** • Vallegrande, Potrerillos; 18°33′S, 064°56′W; 2367 m alt.; 23.IV. 1993; Israel Vargas leg.; 1 ♀ adult, MNKM 3713 (Figs. 2, 3E, F) • Florida, Pampagrande; 17°55′47″S, 064°09′

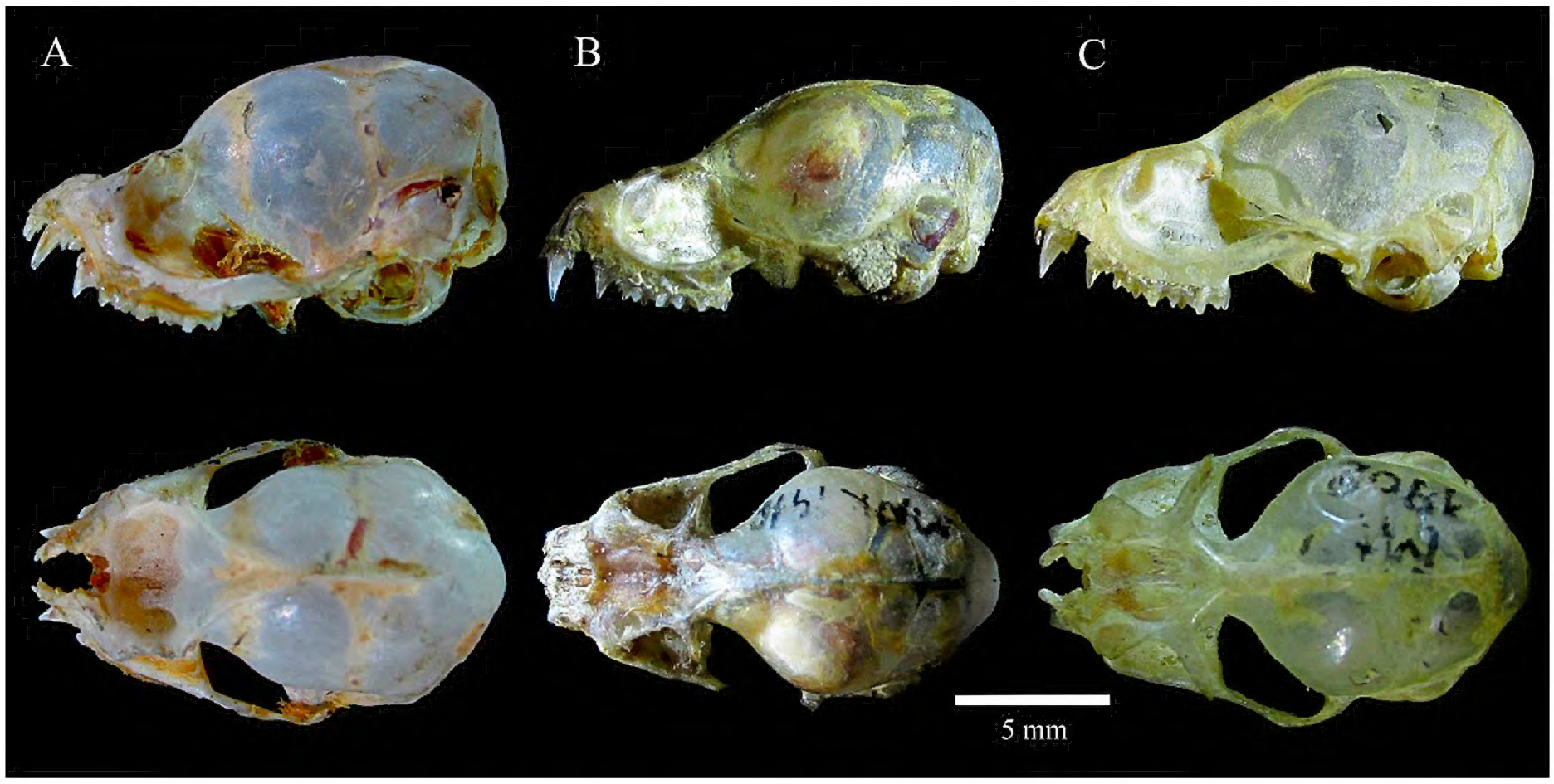

Figure 4. Lateral and dorsal views of the skulls of some bat species. **A.** *Cyttarops alecto* (CBG 401). **B.** *Saccopteryx canescens* (MNKM 1910). **C.** *Saccopteryx leptura* (MNKM 1908).

48″W; 1620 m alt.; I.1996; Arturo Muñoz leg.; 1 ♀ adult, MNKM 3714.

Identification. Acosta and Vanegas (2006) assigned to the female specimen MNKM 3713 to *H. macrotus*, omitting a series of characters that suggested an identity assignable to another taxon.

All the diagnostic characters of this specimen correspond to *H. diaphanopterus*, including strongly bicolored dorsal and ventral hairs (Fig. 3E), pale wing membranes, triangular translucent ears with a prominent lobe on the inner edge, and the presence of a gap between the ears with a membrane of approximately 4 mm height (Fig. 3F; Feijó et al. 2015).

Taxonomic remarks. Acosta and Venegas (2006) provided some external and cranial measurements of MNKM 3713, and they also reported a second specimen, MNKM 3714, of *H. macrotus*. However, Feijó et al. (2015) reidentified this second specimen as *H. diaphanopterus*. Given that the two previously referred individuals constitute the only records assigned to *H. macrotus* in Bolivia and that their identities do not correspond to this taxon, we exclude this species from the inventory of bat species known in Bolivia.

Family Emballonuridae

Cyttarops alecto Thomas, 1913

Material examined. BOLIVIA – **Pando** • Nicolás Suárez, Estación Biológica Tahuamanu; 11°20′11″S, 069°01′69″W; 287 m alt.; 06.IV.2009; Claudio J. Mamani leg.; 1 ♂ adult, CBG 401 (Figs. 2, 4A).

Identification. The specimen CBG 401 shows the following diagnostic traits described for this species: absence of glandular sacs in the uropatagium, thumb covered by the propatagium, skull with a cup-shaped depression, and narrow postorbital processes not fused to the supraorbital ridges (Fig. 4A). Interestingly, CBG 401 and Peruvian representatives of *C. alecto* lack a diagnostic character previously reported for the species, namely the absence of a gap between the upper premolars (see Fig. 4A and Velazco et al. (2011) and Ludeña and Medina (2017) for Peruvian specimens). The Bolivian specimen shows values within the range of morphometric variation indicated for this species (Table 2).

Remarks. Aguirre et al. (2010) published the first record of this species for Bolivia, providing information on the geographic origin of the voucher specimen and the catalog number of the systematic collection where it was deposited (CBG 401). However, they did not include morphometric data or other information to support the identification of this specimen. The record reported here from Bolivia extends the distribution of *C. alecto* 770 km towards the southwestern Amazon (Fig. 2).

Saccopteryx canescens Thomas, 1901

Material examined. BOLIVIA – **Santa Cruz** • Parque Nacional Noel Kempff Mercado; 13°33′10″S, 061°00′51″W; 210 m alt.; 21.IX.1995; María C. Tapia leg.; 1 ♀ adult, MNKM 1910 (Figs. 2, 4B, 5A, B).

Saccopteryx leptura (Schreber, 1774)

Material examined. BOLIVIA – **Santa Cruz** • Parque Nacional Noel Kempff Mercado; 13°33′10″S, 061°00′51″W; 210 m alt.; 20.IX.1995; José L. Santivañez leg.; 1 ♀ adult, MNKM 1908 (Figs. 4C, 5C, D)

Identification. Most of the species of *Saccopteryx* Illiger, 1811 are characterized by having dorsal fur with two pale lines (except in *S. gymnura* Thomas, 1901 and *S. antioquensis* Muñoz & Cuartas, 2001), with cranial traits that include a relatively flat rostrum, long and broad postorbital processes, and well-developed sagittal

Table 2. External and skull measurements (mm), in addition to weight (g), of representative specimens of *Cyttarops alecto, Saccopteryx canescens*, and *S. leptura* collected in Bolivia (CBG, MNKM) and other regions in South America. Range of measurements of *C. alecto* from Thomas (1913), Starrett and de la Torre (1964), Starrett and Casebeer (1968), Baker and Jones (1975), Masson and Cosson (1992), Ochoa et al. (1994), Velazco et al. (2011), Tavares et al. (2012), and Ludeña and Medina (2017). Range of measurements of *S. canescens* from Sanborn (1937), Carter and Dolan (1978), Husson (1962), Brosset and Charles-Dominique (1990), and Velazco et al. (2021).

	Cyttarops alecto			***S. canescens***			***S. leptura***
	Range	***n***	**CBG 401**	**Range**	***n***	**MNKM 1910**	**MNKM 1908**
Total length	70.00–90.00	4	70	—	—	61	63
Tail length	18.00–25.00	3	23	—	—	17	18
Hind foot length	8.00–11.20	5	8	4.80–7.30	7	7	8
Ear length	10.00–13.40	5	12	—	—	12	14
Forearm length	40.00–47.20	12	46.3	34.50–40.80	27	41.76	44.95
Body mass	5.60–9.00	5	—	—	—	4.50	6.00
Greatest length of skull	12.60–14.30	8	14.0	12.30–13.30	23	13.70	14.80
Condylo-canine length	12.26–12.70	3	13.0	11.20–11.60	4	12.26	13.40
Maxillary toothrow length	5.10–5.70	10	5.6	4.60–5.10	23	5.30	5.60
Zygomatic breadth	8.00–8.88	8	8.9	7.70–8.50	22	—	9.29
Braincase breadth	6.70–7.10	8	7.1	6.10–6.50	5	6.85	7.18
Mastoid breadth	7.36–7.70	8	8.2	5.40–7.10	21	7.30	7.83
Postorbital breadth	3.70–4.50	9	4.0	2.10–3.20	21	2.65	2.13
Breadth across molars	5.86–6.30	5	6.4	5.10–5.80	22	5.54	6.44
Breadth across canines	2.40–3.35	6	2.9	2.60–3.00	21	3.10	3.34
Length of mandible	9.98	1	10.7	8.50–9.20	6	7.90	10.08
Mandibular toothrow	—	—	5.7	5.00–6.00	7	5.30	5.81

crests. *Saccopteryx canescens* differs from its congeners by being small (forearm length 35.8–40.8 mm, upper dental row 4.6–5 mm, and width between molars 5.1–6 mm); the dorsal fur is gray or brown and lightly frosted, with two indistinct but evident dorsal lines (Hood and Gardner 2008). *Saccopteryx leptura* has dark brown dorsal fur and clearly visible dorsal lines, in addition to a larger size (forearm length 37.4–42.3 mm, upper dental row 5.1–5.5 mm) (Hood and Gardner 2008).

In comparison with an adult female of *S. leptura* (MNKM 1908; Figs. 4C, 5C, D) collected in the same locality, the specimen MNKM 1910 is smaller in external and cranial dimensions (Table 2), and the fur is more strongly bicolored (Fig. 5B), with dorsal and ventral hairs 8 and 6 mm long, respectively. Despite being smaller, the skull of *S. canescens* presents a greater postorbital width than *S. leptura*. Furthermore, the supraorbital ridges fuse well behind the postorbital constriction in *S. canescens*, whereas in *S. leptura* such fusion occurs almost at the level of the postorbital constriction (Table 2; Fig. 4B, C). All the chromatic characters of the fur and the body dimensions of *S. canescens* match the descriptions of this taxon, although some of its measurements exceed slightly the ranges indicated by other authors (Table 2).

Distribution. It is important to note that the geographic range of *S. canescens* as indicated by Hood and Gardner (2008), Solari (2015), Bonaccorso (2019), and Burgin et al. (2020) did not include Bolivia, even though Emmons (1998) had recorded this species from the country. Fourteen specimens, including the one in this study, represent the southernmost records of this species; they are eight specimens from northwestern Brazil, five from Peru, and one from northeastern Bolivia (Sanborn 1937; Voss and Emmons 1996; Tejedor 2003; Hood and Gardner 2008; Velazco et al. 2021). The specimen recorded here (MNKM 1910) represents the southeastern most locality of *S. canescens*, extending the geographic range of the species 1133 km south of the closest previously known record in the southern extreme of Peru (Tejedor 2003; Fig. 2). The collection site of MNKM 1910 is an open savannah habitat on the edge of the Amazonian Forest, as previously reported for the species by Handley (1976), Jones and Hood (1993) and Emmons (1998).

Discussion

Our review of the existing data of bat species known to occur in Bolivia on the basis of voucher specimens has allowed us to generate a refined and updated checklist after the exclusion of one family and 13 species. Removed from the list of bat species in Bolivia are the following taxa (Table 1): in Emballonuridae, *Centronycteris maximiliani*, *Cormura brevirostris*, *Diclidurus albus*, and *Peropteryx kappleri*; in Phyllostomidae, *Anoura aequatoris*, *A. fistulata*, *A. peruana*, *Glyphonycteris behnii*, and *Micronycteris microtis*; in Furipteridae,

Figure 5. Dorsal and ventral views of the fur of *Saccopteryx canescens* and *S. leptura*. **A, B.** *S. canescens* (MNKM 1910). **C, D.** *S. leptura* (MNKM 1908).

Furipterus horrens (the only species of this family said to occur in Bolivia); in Molossidae, *Molossus currentium* and *M. pretiosus*; and in Vespertilionidae, *Histiotus macrotus*. Additional comments on these species, erroneously identified in previous lists of Bolivian bats, are below.

Centronycteris maximiliani—Venzal et al. (2013) reported a series of ectoparasites taken on nine specimens of this species, which was presumably collected in northeastern Bolivia (12°55′S, 062°52′W; 160 m alt.) near the Guapore River and on the border with Brazil. However, Venzal et al. (2013) did not provide information on the diagnostic traits of the referred specimens that may be used to verify the identity of the species. Furthermore, they did not mention the location of the referred specimens or if they were deposited in a systematic collection. Multiple attempts to contact the senior author on the paper (M.B. Labruna) were unsuccessful in securing access to the specimens. Therefore, it is impossible to confirm the identity of the bats assigned by Venzal et al. (2013) to *C. maximiliani* and, in fact, this species has not been included as part of the fauna of Bolivia in the most recent publications on the group (Sampaio et al. 2016; Bonaccorso 2019; Burgin et al. 2020).

Anoura spp.—According to recent revisionary work, eight South American species are recognized within the genus: *A. cadenai*, *A. caudifer* (including *A. aequatoris*), *A. cultrata, A. fistulata, A. geoffroyi* (including *A. peruana*), *A. javieri, A. latidens* (including *A. carishina*), and *A. luismanueli* (Calderón-Acevedo et al. 2021, 2022). In these publications, records from Bolivia said to be *A. aequatoris* (Mantilla-Meluk et al., 2012) belong instead to *A. caudifer.* Likewise, Bolivian records of *A. peruana* reported by Mantilla-Meluk and Baker (2010) are *A. geoffroyi* instead.

Micronycteris microtis—Recent studies using morphological and genetic data show that this species is a synonym *M. megalotis* (Table 1; Porter et al. 2007; Morales-Martínez et al. 2021), even though Díaz et al. (2021) and Simmons and Cirranello (2023) maintain *M. microtis* as a valid species. On the other hand, although the presence of *Molossus currentium* in the country is probable (Eger 2008; Barquez and Diaz 2016; Taylor et al. 2019; Burgin et al. 2020; Loureiro et al. 2020), its inclusion in the list of bats from Bolivia requires additional evidence.

Molossus pretiosus—This species was reported from Bolivia by Aguirre et al. (2010), based on three voucher specimens (CBG 402, 403, 404); however, these specimens could not be located in the CBG collection and are apparently lost. Aguirre et al. (2010) did not include information on external or cranial measurements, nor a discussion of the diagnostic characters used to identify these specimens. We temporarily recommend discarding *M. pretiosus* from the list of mammals of Bolivia, as suggested by other authors (Solari 2019; Taylor et al. 2019; Burgin et al. 2020), until the presence of this species can be corroborated by vouchered materials deposited in a systematic collection.

The new list of bat species confirmed from Bolivia contains eight families and 133 species (Table 3). The family Phyllostomidae represents the dominant fraction (76 species), followed by Vespertilionidae (21), Molossidae (20), Emballonuridae (8), Mormoopidae (3), Noctilionidae (2), Thyropteridae (2), and Natalidae (1). Two species are endemic to the country—*Micronycteris yatesi* Siles & Brooks, 2013 and *Eptesicus langeri* Acosta, Poma-Urey, Ossa-López, Rivera-Páez & Ramírez-Chaves, 2021—and eight are known by only one specimen—*Cyttarops alecto*, *Eptesicus brasiliensis* (Desmarest, 1819), *Gardnerycteris koepckeae* (Gardner & Patton, 1972), *Lichonycteris degener* Miller, 1931, *Lionycteris spurrelli* Thomas, 1913, *Lophostoma carrikeri* (J.A. Allen, 1910), *Peropteryx pallidoptera* Lim, Engstrom, Reid, Simmons, Voss & Fleck, 2010, and *Saccopteryx canescens*.

Several bat species are known to occur in Bolivia by very few records, just one or two specimens, and have not been reported in the last 30 years. In this group we highlight *Eumops hansae* (only two individuals collected in 1986 and 1992; Ibáñez and Ochoa 1989; Aguirre and Urioste 1994; Anderson 1997), *Lichonycteris degener* (collected in 1979; Anderson et al. 1982), and *Lophostoma carrikeri* (collected in 1964; Koopman 1976). Therefore, we highlight the need to assess the conservation status of these underreported, rare species of bats. Furthermore, exhaustive fieldwork is needed to sample poorly known areas, where there is the greatest chances of success in surveying the fauna. These initiatives must consider the use of conventional and unconventional sampling methods, including ultrasonic detection (Schnitzler and Kalko 2001; Jung et al. 2014) accompanied by acoustic lures in some cases (Hintze at al. 2020), principally for the inventory of aerial insectivorous bats. The reliability of the data provided by this technology has increased to the extent that species' echolocation patterns have been described and are easily distinguishable, but it is essential that these data are accompanied by reference images of typical search phase calls or the descriptions of fundamental parameters (Ochoa et al. 2000; Jung et al. 2007, 2014; Corben and Miller pers. comm.). The availability of acoustic files in libraries or on web pages, such as the ChiroVox bat call database (Görföl 2022), are an important tool for the recognition and the comparison of echolocation patterns as a complement to the collection of duly identified voucher specimens in cases of little-known or cryptic species (e.g., *Centronycteris centralis* Thomas, 1912; Espinal et al. 2021).

Conventional methods to detect or collect bats must include sampling efforts with mist nets in various strata, including the canopy level, and the systematic review of roosts, in addition to the eventual capture of aerial insectivorous bats with shotguns and spotlights in open spaces. All these alternatives, supported by ethical protocols, have demonstrated excellent results in the Neotropics (e.g., Handley 1976; Simmons and Voss 1998; Ochoa et al. 2005, 2008, 2009; Díaz and

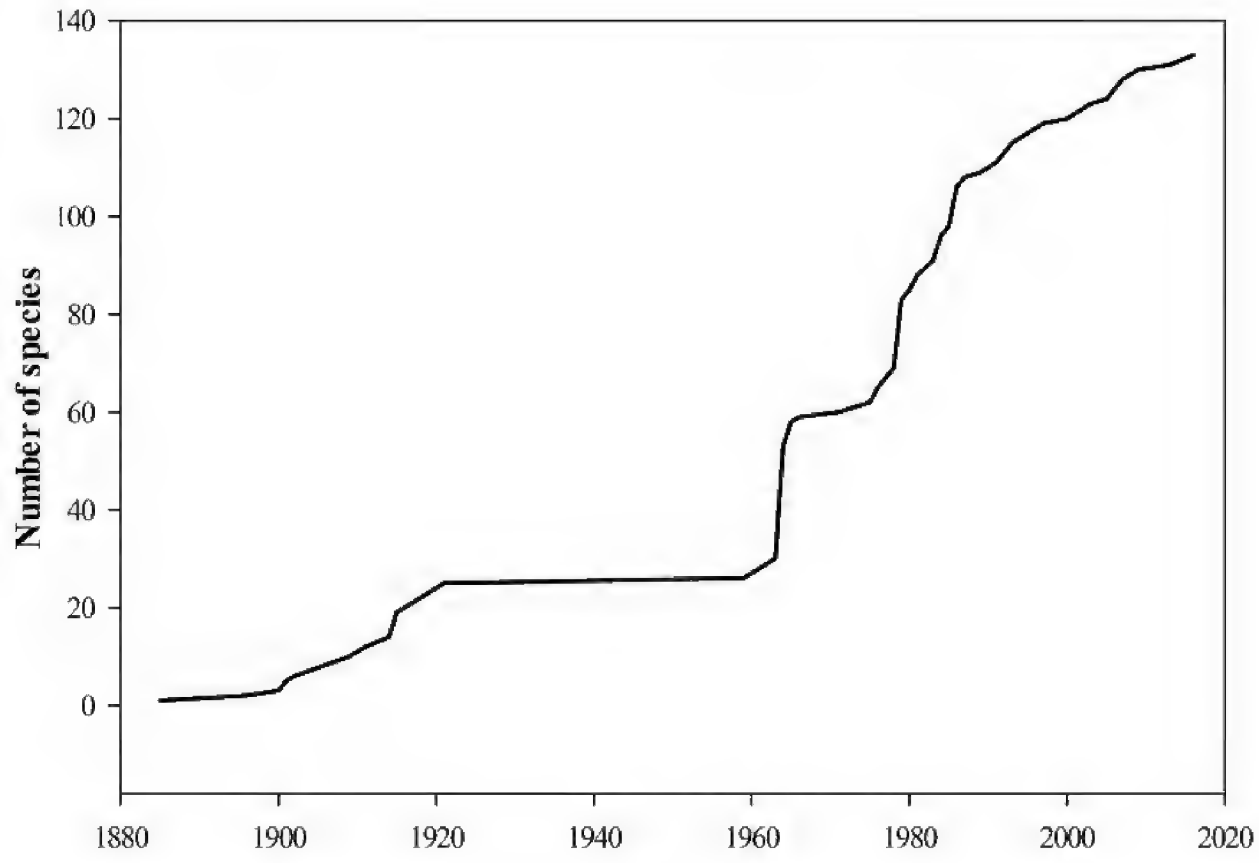

Figure 6. Species-accumulation curve of bat surveys in Bolivia during the period 1885–2016, showing the importance of the expeditions conducted between 1963 and 1981 by the Middle America Research Unit, AMNH, LSUMZ, the Zoológico of Santa Cruz and EBD, the Museum of Southwestern Biology, and the CBF (see Table 3).

Linares 2012; Jung et al. 2014). Finally, it is extremely important that researchers of future faunal surveys must assume the implicit responsibility in careful taxonomic identitification, taking into account the comparative analyses of voucher specimens, consultation of the specialized literature, and the advice of local or regional experts.

Despite the reduction in 8.9% of the species richness of bats of Bolivia as a result of our study (eight families and 133 species versus nine families and 146 species according to D*í*az et al. 2021), the country harbors a high diversity of bats with respect to other Neotropical countries. The collection of voucher specimens represents a fundamental process to preserve key evidence of the distributions and taxonomic identifications of mammal species (López-Vidal and Elizalde-Arellano 2006). In Bolivia, taxonomic inventories of bats have been mostly based on the comparative study of preserved specimens, which have enriched the existing biological heritage in systematic collections (Solari and Baker 2006; Moratelli and Wilson 2014; Velazco and Patterson 2019; Poma-Urey et al. 2021).

Among the taxa that make up the list of bats in Bolivia, 44.8% (60 species) were recorded for the first time between 1960 and 1986, with an important additional contribution in the last 36 years; however, the species-accumulation curve still shows an increasing trend that suggests the need for greater inventory efforts (Fig. 6). The knowledge accumulated in the last decades includes the invaluable fieldwork of at leat 17 national and approximately 40 foreign bat researchers who have generated the data supporting this study (Table 3). Among them, we highlight the works of S. Anderson, J. Steinbach, A. Ximénez, W.D. Webster, C. Ibáñez, C.C. Olrog, C.G. Schmitt, G.K. Creighton, K.F. Koopman, M.L. Kuns, L.H. Acosta, L. Aguirre, D.E. Añez, H. Azurduy, M. Hidalgo, F. Hinojosa, L. Maffei, A. Muñoz, J. Salazar-Bravo, J.L. Santivañez, L. Siles, M.C. Tapia-Arauz, and A. Vargas.

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Table 3. Check list of the bats with presence in Bolivia supported by voucher specimens. References correspond to the first published and documented records for the country.

Taxa	Voucher	Collector(s)	Year	Department	Reference(s)
Family Emballonuridae (8)					
Cyttarops alecto Thomas, 1913	CBG 401	C. Mamani	2009	Pando	Aguirre et al. 2010; this study
Peropteryx leucoptera Peters, 1867	AMNH 209228	K.F. Koopman	1964	Beni	Poma-Urey et al. 2021
Peropteryx macrotis (Wagner, 1843)	CML 1325	C.C. Olrog	1959	Santa Cruz	Barquez 1983
Peropteryx pallidoptera Lim, Engstrom, Reid, Simmons, Voss & Fleck, 2010	MHNC-M 555	M. Hidalgo	2016	Cochabamba	Siles et al. 2021
Rhynchonycteris naso (Wied-Neuwied, 1820)	AMNH 209187	S. Anderson	1964	Beni	Anderson et al. 1982
Saccopteryx bilineata (Temminck, 1838)	FMNH 21474	J. Steinbach	1914	Santa Cruz	Sanborn 1937
Saccopteryx canescens Thomas, 1901	MNKM 1910	M.C. Tapia-Arauz	1995	Santa Cruz	Emmons 1998; this study
Saccopteryx leptura (Schreber, 1774)	AMNH 209225	S. Anderson	1964	Beni	Anderson et al. 1982
Family Phyllostomidae (76)					
Subfamily Carollinae					
Carollia benkeithi Solari & Baker, 2006	AMNH 246548	D.C. Cole	1979	La Paz	Solari and Baker 2006
Carollia brevicauda (Schinz, 1821)	FMNH 21482	J. Steinbach	1914	Santa Cruz	Pine 1972
Carollia manu Pacheco, Solari & Velazco, 2004	AMNH 264995	C.T. Seaton	1993	La Paz	Pacheco et al. 2004
Carollia perspicillata (Linnaeus, 1758)	AMNH 61756	J. Steinbach	1921	Santa Cruz	Anderson et al. 1982
Subfamily Desmodontinae					
Desmodus rotundus (É. Geoffroy, 1810)	BMNH 2.1.1.3	P.O. Simons	1901	Cochabamba	Thomas 1902
Diaemus youngii (Jentink, 1893)	AMNH 209743	S. Anderson	1964	Beni	Koopman 1976
Diphylla ecaudata Spix, 1823	AMNH 261777	L.A. Ruedas	1985	La Paz	Anderson 1991
Subfamily Glossophaginae					
Anoura caudifer (É, Geoffroy, 1818)	AMNH 246468	C.G. Schmitt	1979	La Paz	Anderson et al. 1982
Anoura cultrata Handley, 1960	LSUMZ 22962	S.W. Cardiff	1980	La Paz	Anderson et al. 1982
Anoura geoffroyi Gray, 1838	FMNH 39294	J.D. Haseman	1909	Santa Cruz	Sanborn 1933
Anoura latidens Handley, 1984	AMNH 264604	S. Anderson	1992	La Paz	Calderón-Acevedo and Muchhala 2020
Choeroniscus minor (Peters, 1868)	TTU-M 34789	W.D. Webster	1979	La Paz	Webster and Jones 1980
Glossophaga soricina (Pallas, 1766)	AMNH 61765	J. Steinbach	1921	Santa Cruz	Anderson et al. 1982
Lichonycteris degener Miller, 1931	AMNH 244621	S. Anderson	1979	Cochabamba	Anderson et al. 1982
Subfamily Glyphonycterinae					
Glyphonycteris daviesi (Hill, 1964)	CBF 2908	K.S. Smith	1993	La Paz	Anderson 1997
Trinycteris nicefori (Sanborn, 1949)	CBF 2892	F. Hinojosa	1990	La Paz	Emmons 1991
Subfamily Lonchophyllinae					
Hsunycteris pattoni (Woodman & Timm, 2006)	AMNH 209358	D.E. Añez	1964	Beni	Parlos et al. 2014
Hsunycteris thomasi (J.A. Allen, 1904)	AMNH 262429	C.K. Malcolm	1986	Pando	Anderson 1997
Lionycteris spurrelli Thomas, 1913	MNKM 3283	H. Azurduy	2002	Santa Cruz	Azurduy and Emmons 2005
Lonchophylla dekeyseri Taddei, Vizotto & Sazima, 1983	USNM 584472	L.H. Emmons	2000	Santa Cruz	Moratelli and Dias 2015
Subfamily Lonchorhininae					
Lonchorhina aurita Tomes, 1863	CM 1890	J.D. Haseman	1909	Santa Cruz	Sanborn 1932a
Subfamily Micronycterinae					
Lampronycteris brachyotis (Dobson, 1879)	MNKM 3730	L.H. Acosta	2003	Santa Cruz	Acosta and Aguanta 2005
Micronycteris hirsuta (Peters, 1869)	MNKM 3267	H. Azurduy	2002	Santa Cruz	Azurduy and Emmons 2005
Micronycteris megalotis (Gray, 1842)	UMMZ 126843	G.K. Creighton	1978	Cochabamba	Anderson et al. 1982
Micronycteris minuta (Gervais, 1856)	UMMZ 126729	G.K. Creighton	1978	La Paz	Anderson et al. 1982
Micronycteris sanborni Simmons, 1996	MNKM 1988	L. Maffei	1996	Santa Cruz	Poma-Urey et al. 2020
Micronycteris yatesi Siles & Brooks, 2013	MHNC-M 157	L. Siles, A. Muñoz	2007	Chuquisaca	Siles et al. 2013

Taxa	Voucher	Collector(s)	Year	Department	Reference(s)
Subfamily Phyllostominae					
Chrotopterus auritus (Peters, 1856)	AMNH 209353	S. Anderson	1964	Beni	Anderson et al. 1982
Gardnerycteris crenulatum (É. Geoffroy, 1803)	AMNH 209323	S. Anderson	1964	Beni	Koopman 1976
Gardnerycteris koepckeae (Gardner & Patton, 1972)	CBF 8683	L. Siles	2016	La Paz	Siles and Wallace 2021
Lophostoma brasiliense Peters, 1866	CBF 179	J. Salazar-Bravo	1987	Beni	Wilson and Salazar-Bravo 1990
Lophostoma carrikeri (J.A. Allen, 1910)	AMNH 209322	S. Anderson	1964	Beni	Koopman 1976
Lophostoma silvicolum d'Orbigny, 1836	FMNH 44867	J. Steinbach	1911	Santa Cruz	Davis and Carter 1978
Macrophyllum macrophyllum (Schinz, 1821)	AMNH 209320	S. Anderson	1964	Beni	Harrison 1975
Phylloderma stenops Peters, 1865	CML 413	R. Ojeda, R.M. Barquez	1975	Santa Cruz	Barquez and Ojeda 1979
Phyllostomus discolor (Wagner, 1843)	AMNH 209325	A. Ximénez	1964	Beni	Anderson et al. 1982
Phyllostomus elongatus (É. Geoffroy, 1810)	AMNH 209331	K.F. Koopman	1964	Beni	Anderson et al. 1982
Phyllostomus hastatus (Pallas, 1767)	AMNH 61751	J. Steinbach	1921	Santa Cruz	Anderson et al. 1982
Tonatia bidens (Spix, 1823)	MNKM 4745	F. Aguanta	2005	Santa Cruz	Paca et al. 2012
Tonatia maresi Williams, Willig & Reid, 1995	CBF 2849	L.H. Emmons	1992	Pando	Emmons and Smith 2002
Trachops cirrhosus (Spix, 1823)	AMNH 209348	A. Ximénez	1964	Beni	Koopman 1976
Vampyrum spectrum (Linnaeus, 1758)	AMNH 261379	J.A. Cook	1985	Beni	Anderson 1991
Subfamily Rhinophyllinae					
Rhinophylla pumilio Peters, 1865	MSU 32895	W.D. Webster	1979	La Paz	Webster and Jones 1980
Subfamily Stenodermatinae					
Artibeus lituratus (Olfers, 1818)	AMNH 1255	H.H. Rusby	1885	Cochabamba	Allen 1904
Artibeus obscurus (Schinz, 1821)	AMNH 38502	L.E. Miller, H.S. Boyle	1915	Cochabamba	Anderson 1997
Artibeus planirostris (Spix, 1823)	TTU-M 34863	W.D. Webster	1979	La Paz	Webster & Jones 1980
Artibeus (*Koopmania*) *concolor* Peters, 1865	CBG 450	A. Vargas	2006	Pando	Vargas and Balderrama 2009
Dermanura anderseni (Osgood, 1916)	CM 2734	J. Steinbach	1911	Santa Cruz	Sanborn 1932a
Dermanura glauca (Thomas, 1893)	CML 2207	C.C. Olrog	1976	Cochabamba	Barquez and Olrog 1980
Dermanura gnoma (Handley, 1987)	LSUMZ 32966	W.D. Webster	1979	La Paz	Webster and Jones 1980
Chiroderma salvini Dobson, 1878	AMNH 246625	C.G. Schmitt	1979	La Paz	Anderson et al. 1982
Chiroderma trinitatum Goodwin, 1958	AMNH 209520	K.F. Koopman	1964	Beni	Koopman 1976
Chiroderma villosum Peters, 1860	AMNH 61754	J. Steinbach	1921	Santa Cruz	Koopman 1976
Enchisthenes hartii (Thomas, 1901)	TTU-M 34880	W.D. Webster	1979	La Paz	Webster and Jones 1980
Mesophylla macconnelli Thomas, 1901	AMNH 209577	R.G. Van Gelder	1964	Beni	Koopman 1976
Platyrrhinus albericoi Velazco, 2005	CML 1581	C.C. Olrog	1976	Cochabamba	Barquez and Olrog 1980
Platyrrhinus brachycephalus (Rouk & Carter, 1972)	UMMZ 126755	G.K. Creighton	1978	Cochabamba	Velazco 2005
Platyrrhinus incarum (Thomas, 1912)	USNM 461044	V. Adcock	1971	Cochabamba	Anderson 1997
Platyrrhinus infuscus (Peters, 1880)	CML 2215	C.C. Olrog	1976	Cochabamba	Barquez and Olrog 1980
Platyrrhinus lineatus (É. Geoffroy, 1810)	AMNH 210805	A. Ximénez	1965	Beni	Anderson 1997
Platyrrhinus masu Velazco, 2005	AMNH 246610	C.G. Schmitt	1979	La Paz	Velazco 2005
Platyrrhinus umbratus (Lyon, 1902)	UMMZ 127174	G.K. Creighton	1978	La Paz	Velazco et al. 2018
Pygoderma bilabiatum (Wagner, 1843)	AMNH 246399	R.M. Barquez, R. Ojeda	1975	Santa Cruz	Ojeda and Barquez 1978
Sphaeronycteris toxophyllum Peters, 1882	AMNH 209740	S. Anderson	1964	Beni	Koopman 1976
Sturnira erythromos (Tschudi, 1844)	MSU 32905	W.D. Webster	1979	La Paz	Webster and Jones 1980
Sturnira giannae Velazco & Patterson, 2019	AMNH 209418	A. Ximénez	1964	Beni	Velazco and Patterson 2019
Sturnira lilium (É. Geoffroy, 1810)	CM 1944	J. Steinbach	1909	Santa Cruz	Sanborn 1932a
Sturnira magna de la Torre, 1966	TTU-M 34907	W.D. Webster	1979	La Paz	Webster and Jones 1980
Sturnira oporaphilum (Tschudi, 1844)	LSUMZ 23065	T.A. Parker	1979	La Paz	Webster and Jones 1980

Taxa	Voucher	Collector(s)	Year	Department	Reference(s)
Sturnira sorianoi Sánchez-Hernández, Romero-Almaraz & Schnell, 2005.	AMNH 260870	C.G. Schmitt	1984	Santa Cruz	Sánchez-Hernández et al. 2005
Sturnira tildae de la Torre, 1959	AMNH 209419	A. Ximénez	1964	Beni	Anderson et al. 1982
Uroderma bilobatum Peters, 1866	BMNH 1.2.1.37	P.O. Simons	1900	Beni	Davis 1968
Uroderma magnirostrum Davis, 1968	AMNH 209425	S. Anderson	1964	Beni	Davis 1968
Vampyressa thyone Thomas, 1909	AMNH 262524	T.L. Yates	1986	Pando	Anderson 1991
Vampyriscus bidens (Dobson, 1878)	LSUMZ 26652	C.M. Fugler	1981	Beni	Anderson and Webster 1983
Vampyrodes caraccioli (Thomas, 1889)	AMNH 209518	K.F. Koopman	1964	Beni	Anderson et al. 1982
Mormoopidae (3)					
Pteronotus gymnonotus (Wagner, 1843)	EBD 14269	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Pteronotus personatus (Wagner, 1843)	EBD 14294	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Pteronotus rubiginosus (Wagner, 1843)	EBD 14267	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Noctilionidae (2)					
Noctilio albiventris Dermarest, 1818	AMNH 210540	S. Anderson	1965	Beni	Anderson et al. 1982
Noctilio leporinus (Linnaeus, 1758)	AMNH 210666	A. Ximénez	1965	Beni	Anderson et al. 1982
Thyropteridae (2)					
Thyroptera discifera (Lichtenstein & Peters, 1855)	MNKM 1907	J.L. Santivañez	1995	Santa Cruz	Emmons et al. 2006
Thyroptera tricolor Spix, 1823	LSUMZ 26686	C.M. Fugler	1981	Beni	Anderson and Webster 1983
Natalidae (1)					
Natalus macrourus (Gervais, 1856)	SJRP 14507	W. Uieda, A. Rodrigues	1983	Santa Cruz	Taddei and Uieda 2001
Molossidae (20)					
Cynomops abrasus (Temminck, 1826)	EBD 13520	C. Ibáñez, F. Braza	1983	Santa Cruz	Ibáñez 1985
Cynomops planirostris (Peters, 1866)	FMNH 96038	M.L. Kuns	1963	Beni	Anderson et al. 1982
Eumops auripendulus (Shaw, 1800)	USNM 239009	W.M. Mann	1921	La Paz	Sanborn 1932b
Eumops chimaera Gregorin, Moras, Acosta, Vasconcellos, Poma, dos Santos & Paca, 2016.	MNKM 4753	R.C. Paca	2009	Santa Cruz	Gregorin et al. 2016
Eumops glaucinus (Wagner, 1843)	USNM 390643	G.L. Ranck	1966	Beni	Eger 1977
Eumops hansae Sanborn, 1932	EBD 14295	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Eumops patagonicus Thomas, 1924	FMNH 21536	R.H. Becker	1915	Beni	Sanborn 1932b
Eumops perotis (Schinz, 1821)	FMNH 116690	M.L. Kuns	1963	Beni	Anderson and Webster 1983
Eumops trumbulli (Thomas, 1901)	AMNH 209900	A. Ximénez	1964	Beni	Eger 1977
Molossops temminckii (Burmeister, 1854)	FMNH 115814	M.L. Kuns	1963	Beni	Anderson et al. 1982
Molossus fluminensis Lataste, 1891	AMNH 263285	S. Anderson	1987	Santa Cruz	Loureiro et al. 2020
Molossus molossus (Pallas, 1766)	CM 1892	J.D. Haseman	1909	Beni	Anderson 1991
Molossus rufus É. Geoffroy, 1805	AMNH 211279	D.E. Añez	1965	Beni	Anderson et al. 1982
Neoplatymops mattogrossensis (Vieira, 1942)	MNKM 3710	G. Sánchez, E. Cortez	2006	Santa Cruz	Acosta et al. 2006
Nyctinomops aurispinosus (Peale, 1848)	EBD 14282	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Nyctinomops laticaudatus (É. Geoffroy, 1805)	AMNH 209774	S. Anderson	1964	Beni	Anderson et al. 1982
Nyctinomops macrotis (Gray, 1840)	EBD 14046	C. Ibáñez	1986	Santa Cruz	Ibáñez and Ochoa 1989
Promops centralis Thomas, 1915	AMNH 260273	S. Anderson	1984	Santa Cruz	Anderson 1991
Promops nasutus (Spix, 1823)	AMNH 260306	S. Anderson	1984	Santa Cruz	Anderson 1997
Tadarida brasiliensis (I. Geoffroy, 1824)	CM 5278	J. Steinbach	1921	Cochabamba	Sanborn 1932a
Vespertilionidae (21)					
Eptesicus andinus J.A. Allen, 1914	BMNH 2.1.1.1	M.R. O. Thomas	1901	Cochabamba	Acosta et al. 2021
Eptesicus brasiliensis (Dermarest, 1819)	AMNH 260257	N. Olds	1984	Santa Cruz	Poma-Urey et al. 2019
Eptesicus chiriquinus Thomas, 1920	MHNC-M 154	L. Siles	2007	Chuquisaca	Siles 2007
Eptesicus diminutus Osgood, 1915	MNKM 5658	A.M. Osinaga	1997	Santa Cruz	Poma-Urey et al. 2019

Taxa	Voucher	Collector(s)	Year	Department	Reference(s)
Eptesicus furinalis (d'Orbigny & Gervais, 1847)	LSUMZ 26690	C.M. Fugler	1981	Beni	Anderson et al. 1982
Eptesicus langeri Acosta, Poma-Urey, Ossa-López, Rivera-Páez & Ramírez-Chaves, 2021	MNKM 5584	L.H. Acosta	2013	Santa Cruz	Acosta et al. 2021
Histiotus diaphanopterus Feijó, da Rocha & Althoff, 2015	AMNH 264086	J. Salazar-Bravo	1991	Santa Cruz	Semedo and Feijó 2016
Histiotus laephotis Thomas, 1916	BMNH 97.2.25.1	A. Borelli	1896	Tarija	Thomas 1916
Histiotus montanus (Philippi & Landbeck, 1861)	EBD 13256	J. Cabot-Nieves, P. Serrano	1983	La Paz	Ibáñez 1985
Histiotus velatus (I. Geoffroy, 1824)	CBF 206	F. Hinojosa	1989	La Paz	Anderson 1997
Lasiurus blossevillii (Lesson & Garnot, 1826)	AMNH 209773	A. Ximénez	1964	Beni	Anderson et al. 1982
Lasiurus ega (Gervais, 1856)	FMNH 21476	J. Steinbach	1915	Santa Cruz	Anderson et al. 1982
Lasiurus villosissimus É. Geoffroy, 1806	LSUMZ 22703	J.V. Jr. Remsen	1980	La Paz	Anderson et al. 1982
Myotis albescens (É. Geoffroy, 1806)	AMNH 209767	S. Anderson	1964	Beni	LaVal 1973
Myotis dinellii Thomas, 1902	AMNH 39003	L.E. Miller, H.S. Boyle	1915	Potosí	Anderson 1997
Myotis keaysi J.A. Allen, 1914	AMNH 23161	J.V. Jr. Remsen	1979	La Paz	Anderson et al. 1982
Myotis midastactus Moratelli & Wilson, 2014	AMNH 211156	S. Anderson	1965	Beni	Moratelli and Wilson 2014
Myotis nigricans (Schinz, 1821)	AMNH 38503	L.E. Miller, H.S. Boyle	1915	Cochabamba	Anderson et al. 1982
Myotis oxyotus (Peters, 1866)	BMNH 2.2.2.125	P.O. Simons	1902	La Paz	LaVal 1973
Myotis riparius Handley, 1960	AMNH 260251	N. Olds	1984	Santa Cruz	Anderson 1991
Rhogeesa io Thomas, 1903	FMNH 115807	M.L. Kuns	1963	Beni	Anderson et al. 1982

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